from the non-magnetic into the magnetic condition are represented by lines, which show the formation of a definite series of solid solutions, instead of by blurred areas. The appendix, in which the various binary, ternary, and quaternary systems which have been studied are classified and summarised, has been revised to include publications received down to the time of going to press. The new edition incorporates the results of nine years of work in metallography, and it can be heartily commended for its up-to-date presentation of this important subject.

(3) The first edition of Dr. Hilditch's "Concise History of Chemistry" was reviewed in NATURE of October 19, 1911, p. 510. The new edition has been expanded from 263 to 276 pages, and, in view of the number of additional topics that have come into prominence during the past ten years, it is clear that the conciseness of the old edition has been at least fully maintained in the new. It will thus be found that the nucleus atom, X-ray analysis of crystals, Moseley's atomic numbers, the octet theory of Langmuir and the discovery of isotopes, are all described in the course of three pages in the chapter on the "Ultimate Constitution of Matter," although another page is given later on to some of these subjects. Gas warfare is described in a paragraph of eleven lines, and "anti-gas" is summed up in a paragraph of four lines. In a few details only the revision is perhaps incomplete, *e.g.* the list of the metals of the rare earths is still that of 1909, with holmium omitted, and the atomic weights (which are of the same date) might well have been supplemented by giving also the atomic numbers; moreover, the new matter is by no means fully represented in the subject index, although the author-index appears to have been revised. The value of the book as an index of chemical discoveries is preserved in the new edition, although it would obviously be useless to look for detailed descriptions in so compact a volume.

(4) Prof. Washburn's "Principles of Physical Chemistry" was reviewed in these columns on June 1, 1916, p. 277, and has established a wide reputation in this country as well as in the country of its origin. As the first edition appeared but seven years ago, only those subjects which have developed since the war have called for further elaboration. These include, however, the work of Aston on isotopes and all the recent work on atomic and molecular structure. It is, indeed, remarkable evidence of the rapid progress which has been made in this field that, while the first edition stops with an account of the qualitative aspects of the periodic classification, and of the models which Soddy and Harkins put forward in order to explain the sequence of properties, these two figures have disappeared in the second edition in favour of a large chart illustrating the Lewis-Langmuir theory; and this chart in turn is probably already obsolete in view of the suggestions put forward by Bohr for making use of the quantum-orbits of the electrons as a basis for the periodic classification of the elements. The work on the X-ray analysis of crystal-structure, which was briefly mentioned in the first edition, claims eight pages in the second edition. Anisotropic liquids are, however, inadequately (and perhaps incorrectly) dealt with, especially in view of recent French work on this subject.

(5) Dr. Michaelis's book on "Hydrogen Ion Concentration" was first issued in 1914. The present volume is a new edition of the first and theoretical part of the book, and covers two main topics, namely, the chemical equilibrium of ions and ions as sources of differences of electrical potential. The subject has attracted even more attention from physiologists than from chemists, and Dr. Michaelis's book is actually issued as the first volume of the series of monographs on physiology; but this does not detract from its value to physical chemists, and especially to those who are liable to be called upon to answer the conundrums of their biochemical colleagues.

Phosphatic Fertilisers.

Basic Slags and Rock Phosphates. By Dr. G. Scott Robertson. (Cambridge Agricultural Monographs.) Pp. xvi+120. (Cambridge: At the University Press, 1922.) 14*s.* net.

DURING and since the war the position in this country with regard to the supply of basic phosphatic fertilisers has undergone a radical change. On one hand, the ousting of the older Bessemer process by the modern open hearth process of steel-making has led to the virtual disappearance from the market of the high grade basic slag to which the agriculturist was accustomed, and its replacement by a totally different material of much lower phosphorus content and frequently of low "citric-solubility." On the other hand, the development of the extensive deposits of rock phosphate in the Pacific Islands has rendered available greatly increased amounts of this material. The field experiments at Cockle Park, from which most of our knowledge of the value of basic slag in agriculture was derived, were carried out with the now obsolete high grade Bessemer material, and prior to Dr. Robertson's experiments practically nothing was known as to the fertilising value of the new open hearth slags; the experiments in this country on raw rock phosphate were also few in number and not very conclusive in result.

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Dr. Scott Robertson's experiments were carried out on several different farms in various parts of Essex during the years 1915–20, and were designed to test the relative fertilising value of Bessemer and open hearth basic slag, and of mineral phosphates, on permanent grassland cut for hay. The results of these experiments form one of the most important contributions which have been made in recent years to the literature of phosphatic manures, and their publication in book form is thus very welcome. It was found that on heavy soils of the London Clay and Boulder Clay the improvement effected by rock phosphates compared favourably with that due to high-soluble basic slags, especially in a wet season when the hay harvest was late, and on sour soils. The low-soluble fluorspar slags were definitely inferior, though still effecting a considerable improvement. At two of the centres where the experiments were carried out there was no response to phosphatic manuring, and the author produces evidence that this is due to the operation of another limiting factor, probably deficiency of potash. This point is of interest in connexion with the fact, well known to agriculturists, that basic slag is not invariably effective on all grassland. It is quite likely that some, at least, of these failures are due to a similar cause.

Dr. Robertson did not restrict his work to the determination of the yields of hay on his plots. He presents interesting data on the botanical composition of the herbage, and on the effect of the phosphatic manures on such soil factors as moisture content, temperature, total nitrogen and nitrate content, bacterial numbers, and acidity, all of which, together with climate conditions, are considered in relation to their possible influence on the yields obtained.

Needless to say, the book is well printed and produced, but the price is high for a small volume and will certainly react unfavourably on its sale. This is regrettable, for it deserves a wide circulation among all interested in the improvement of our grasslands and in the country's agricultural production.

H. J. P.

Our Bookshelf.

(1) *Potash.* By Sydney J. Johnstone. New edition revised and enlarged. (Imperial Institute. Monographs on Mineral Resources, with special reference to the British Empire.) Pp. x+122. (London: John Murray, 1922.) 6*s.* net.

(2) *Oil Shales.* By Dr. H. B. Cronshaw. (*Ibid.*) Pp. x+80. (London: John Murray, 1921.) 5*s.* net.

(1) MR. S. J. JOHNSTONE'S monograph on sources of potash is the most useful summary that has been produced since that written by Messrs. H. S. Gale and W. B. Hicks for the Geological Survey of the United States ("Potash in 1917," published 1919). It has no index, but ends with an excellent bibliography, arranged in the sequence of references to the papers in the text. The author deals with all commercial sources of potash, including (p. 112) the product styled Karroo ash, a residue from the ignition of the sheep-dung used as fuel in the Karroo region of S. Africa. The attention now given to alunite is well reflected in the summaries on pp. 51 to 60. The methods of treatment are described, and it may be remembered that a research by W. T. Schaller, the mineralogist, led to the suggestion of the simultaneous extraction from alunite of potash and alumina for commercial purposes. The nomenclature in the analyses of products from the Alsatian mines on p. 12 does not agree with that adopted elsewhere in the text, and the use of "kainite," here and on p. 5, as a synonym for "sylvinite" is an obvious error. "Sylvinite" is, of course, a trade-name for a mixture of sylvine and rock-salt. It is surely time that "muriate of potash," as a name for a substance containing no potash, disappeared. On p. 5 the potassium-content of various products is given, calculated as potash, and the German and other salts are quoted as yielding 100 per cent. We believe that 12·4 per cent. was the official figure adopted by the German Potash Syndicate in 1921. The account of the occurrences of the ordinary soluble potassium salts seems the least satisfactory part of the present memoir. What, for instance, is meant (p. 11) by "the amount of potash averages 30 per cent. of potassium chloride" in the description of an Alsatian deposit?

(2) Dr. Cronshaw's review of oil-shale resources is valuable as a record of attempts to locate such shales by boring in England. Something seems to have gone astray in the account of the Ballycastle coalfield (p. 28), where the Scottish "Broxburn shale" and a place called "Newlygen" are introduced. The description of explorations and results in other countries shows how comparatively successful the industry has been in south-eastern Scotland, though even here the refineries are now to be supplied with imported oil. The author provides a good general and local bibliography.

G. A. J. C.

Town Theory and Practice. By W. R. Lethaby, G. L. Pepler, Sir T. G. Chambers, R. Unwin, and R. L. Reiss. Edited, with an Introduction, by C. B. Purdom. Pp. 139. (London: Benn Bros., Ltd., 1921.) 5*s.* net.

MR. PURDOM points out that, notwithstanding the frequent mention of "garden-cities" in the popular press, it is not generally understood that it is a technical term denoting a self-contained area set out upon a definite plan and including within its boundaries all the requisite elements for the life of an independent community, and that Letchworth and Welwyn alone conform to this definition. This little book on the theory and practice of the garden-city contains five essays which deal with various aspects of the question. Mr. W. R. Lethaby deals with the town itself in an essay of a general character; Mr. G. L. Pepler describes the town plan, showing how the garden-city endeavours to combine practical utility, the convenience of the workers and business undertakings, and æsthetic and hygienic considerations, and Mr. Raymond Unwin, in

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